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ABSTRACT

This study compares junior college students assigned to remedial classes in English and mathematics who subsequently completed regular courses in these subjects, with those assigned directly to regular courses. Students studied were from seven junior colleges that participated in the 1967-68 experimental phases of the Comparative Guidance and Placement Program, an activity of the College Entrance Examination Board. Achievement and noncognitive measures were used in analysis. The two methods of analysis used were: (1) descriptive, where remedial and regular groups were compared according to pre-selected variables and obtained correlations between remedial and regular course grades for remedial groups; and (2) covariance analysis, used to increase precision in randomized experiments and to examine group performance in college courses, controlling for ability as measured by English achievement test scores. Remedial students tended to have higher grades on first regular English courses than students who were assigned directly to regular courses. There were fewer significant differences in mathematics courses. The results of this study throw light on characteristics and factors that may unnecessarily restrict the access of students to specific courses or programs of study. (CA)

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IMPROVING PLACEMENT METHODS IN JUNIOR COLLEGE[1]

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The practice of providing remedial training in English and mathematics is especially important in public junior colleges where open admission is generally prevalent. Such programs provide a means for eliminating weaknesses so that students can proceed with regular college courses. This particular project is a comparative study of two groups of junior college students: (a) those assigned to remedial classes in English and mathematics, subsequently completing regular courses in these subjects, and (b) those assigned directly to regular courses in English and mathematics. These students were enrolled in seven junior colleges which had participated in the 1967 and 1968 experimental phases of the Comparative Guidance and Placement Program, an activity of the College Entrance Examination Board. These colleges were selected for this investigation because they had sufficient numbers of students in remedial programs in English and/or mathematics for data analysis purposes. The remedial courses were initially identified from the respective college catalogs. Information on how these students were assigned to remedial courses was not obtained, but it is probably safe to assume that the basis for placement varied across colleges and perhaps even within colleges.

All measures used in the analyses were instruments in the CGP battery of tests available for the experimental tryouts of this Program in 1967 and 1968. Descriptions of these variables precede the references listed at the end of this paper. Some are achievement measures; others are noncognitive measures. The

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Satisfaction scales, administered near the end of the first term, were obtained by factor analyzing the Satisfaction Questionnaire (Modu, 1970). The relative independence of these scales and the stability of their factor structure over a two-year period in different population samples provided a set or reliable items which, incidentally, have no relationship with school grades but discriminate among college students along three major dimensions of a satisfaction-dissatisfaction continuum. (The third scale is Satisfaction with Major Field, which was not considered appropriate for this study.)

The criterion used for assessing the effects of remediation is the final course grade in the first regular college course in the specific area. This information was obtained by following up on the remedial students identified from the initial administrations. In some colleges, remediation involved more than one semester of pre-college preparation. Course grades were reported on a scale in which A equals 4, B equals 3, C equals 2, D equals 1, and all other experiences, including failures,equal zero. However, in the followup to obtain final course grades for remedial students, those who dropped out of school and those who withdrew from the regular course with passing grades were excluded from the analysis. Other withdrawals, such as students who dropped these courses with failing grades, were reported as failures (or zero). In local studies, a separate category might be created for withdrawals, since it may be argued that these are atypical cases.

Two different analyses were used in this study. The first is descriptive, comparing remedial and regular groups with respect to preselected variables and obtaining correlations between remedial course grades and regular course grades for remedial groups. The "t" test identifies significant differences in group means on these variables. The second procedure uses analysis of covariance as

developed by Gulliksen and Wilks. (See General Note in Table 3.) For this program, n's for remedial groups should be at least 50; however, in this study, the remedial group in one college had 48 students. The predictor variables used in this study are those previously shown to have the highest correlations with the criterion of final course grade in first regular college courses. As noted in the discussion of placement studies in the Validity Study Service of the CGP Program, Ford (1970) reports that the best single predictor of grades in English Composition in 30 of the 38 courses studied in 1968 is the Sentences Test. This was the single predictor used in the covariance analyses. Covariance analyses were also run using the Sentences-Verbal combination, which is also an efficient predictor set for English Composition course grades. Because sex differences are evident in CGP data, and especially on attitudinal scales, analyses are presented separately by sex whenever n's are sufficiently large. Due to sample sizes, covariance analyses were not run for remedial mathematics groups. The CGP VSS placement studies show that the combination of the Mathematics Test and the Comparative Interest Index in mathematics is a good predictor of course grades in regular mathematics courses.

Covariance analyses are used most frequently to increase precision in randomized experiments. However, such controls were not imposed on the groups studied in this research. Covariance analyses are used here to examine group performance in college courses, controlling for ability as measured by English achievement test scores. In these covariance analyses, the errors of estimate in predicting final course grade from English achievement measures and the slopes of the regression lines were not significantly different for the groups studied.

Results

Tables 1 and 2 present descriptive statistics for all colleges in this study. Except for College B, comparisons are made between students who took a remedial sequence and students who entered directly into regular college English and mathematics courses. In College B, because of the unavailability of grades for regular students on the same college course that was taken by remedial students who completed one of the remedial sequences (either a one- or two-semester remedial program), comparisons could be made only between remedial groups.

The comparisons in Table 1 show significant differences between remedial and regular groups in performance on the Sentences and Verbal measures. For non-cognitive measures, differences are significant in Colleges A, B, and C on the Comparative Interest Index Scale in English. However, the greatest significance, as indicated by the largest "t" value, appears for the two remedial groups in College B. Students in a two-semester remedial program are significantly less interested in English than those assigned to a one-semester remedial program--a fact that College B may wish to investigate further. Yet they are not significantly different in satisfaction with the first remedial course taken. Noteworthy differences are evident on the Academic Motivation scale in Colleges B and E, but none on the Satisfaction with English scale. In College E, one-semester remedial students did significantly better than regular students on the criterion. While the differences in means on the criterion are not generally significant, there is a trend for remedial students to have higher grades on the first regular English courses than students who are assigned directly to regular courses. Correlations between the grades earned by remedial students in remedial English courses and in regular English courses after remediation are moderate, approximately .45.

Table 2 shows fewer significant mean differences on achievement measures between remedial and regular students in mathematics courses than was true for students taking English courses. However, in two of the four colleges (Colleges E and F), mean grades on the first regular college course in mathematics are significantly different for the two groups, with remedial students not doing as well in regular courses in mathematics as regular students did. In College A, the Satisfaction with Mathematics Course scale produced significant mean differences between the remedial and regular groups; while in Colleges E and G, the Comparative Interest Index in mathematics produced significant group differences.

Results of the covariance analyses in Table 3 show that, controlling on achievement measures, remedial students in two of the three colleges did significantly better in regular college English courses than students who did not have the benefit of remedial training. Covariance analyses were run with one and two predictors to judge whether or not the addition of a predictor supplied additional information about the groups. Where, in College B, no significant differences were found using only Sentences as a predictor, the addition of the Verbal score shows that men in the two-semester remedial program did significantly better in the first college English course taken than men who completed a one-semester remedial program.

Discussion

The types of analyses used in this research are not directly concerned with evaluating criteria for placement. The effectiveness of initial placement procedures was examined by Reilly (1970), who combined CGP scores in a linear discriminant function where the actual placement of students in the respective courses served as criterion. He showed that placement was predictable to some extent, and that certain predictors showed consistently high relationships with placement decisions over different schools.

In his 1970 study on "Effectiveness of Remediation in Junior College," Sharon used random assignment of remedial students and compared regular, remedial, and control students on CGP measures. One of the two colleges in his study is College A in this present study. Sharon found that there were no significant differences among his groups in terms of satisfaction with English courses. He also found that the remedial English course had a modest but significant effect on performance in the regular English course. The analysis of covariance in College A in this study also shows significant gains from remediation in performance on the regular English course.

While the results of the analysis techniques used in this study do not provide rigorous evidence concerning the effectiveness of placement, they can throw some light on characteristics and factors which may unnecessarily restrict the access of students to specific courses or programs of study. The use of noncognitive measures can be extremely illuminating. For example, continuing dissatisfaction with remedial courses may be a clue for content restructuring. If it is essential

to know whether more students can function in regular courses without remediation, then experimental groups must be identified and studied.

The types of analyses described in this paper can provide clues for further investigation by researchers. They also can be performed in a relatively easy manner. They can at least answer such questions as: Do students who had remediation do as well in the first regular college course as students who were not given remedial preparation for that course? What is the relationship between remedial course grades and regular course grades for students who completed a remedial sequence? How do remedial and regular students compare on measures that have a high correlation with relevant course grades? Are there significant differences between remedial and regular students on noncognitive measures related to attitude, interest, and background information?

Table 1

Comparisons Between Beginning Junior College Students in Remedial and Regular English Courses on Specific Achievement, Noncognitive, and Criterion Measures

I. ACHIEVEMENT MEASURES

College	Sentences Test					Verbal Test				
	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df
A	45.16	52.40	-7.24	-8.73†	421	46.39	53.04	-6.65	-7.38†	421
B	51.33[c]	53.68[c]	-2.35	-1.95	145	51.88[c]	52.17[c]	- .29	-.26	145
C	47.56	52.19	-4.63	-4.95†	556	47.47	51.20	-3.73	-4.77†	556
D	43.00	48.63	-5.63	-3.83†	181	41.82	46.36	-4.54	-2.98†	181
E[a]	42.00	53.18	-11.18	-9.79†	328	44.95	52.95	-8.00	-5.35†	321
E[b]	40.24	53.18	-12.94	-9.50†	313	38.71	52.95	-14.24	-12.50†	306

II. NONCOGNITIVE MEASURES

College	Comparative Interest Index, English Scale					Academic Motivation					Satisfaction with English Course				
	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df	Means (Rem.)	Means (Reg.)	Diff. in Means	"t"	df
A	10.30	14.08	-3.78	-4.47†	417	48.37	46.65	1.72	.98	164	1.99	1.64	.35	.97	424
B	10.50[c]	18.26[c]	-7.76	-6.42†	145	19.43[c]	22.36[c]	-2.93	-3.73†	99	.44[c]	1.47[c]	-1.03	-1.58	145
C	14.46	16.84	-2.38	-2.78†	567	22.92	23.08	- .16	- .36	526	.38	.76	- .38	-1.23	567
D	12.21	14.03	-1.82	-1.50	200	21.67	21.58	.09	.12	200	2.44	2.23	.21	.36	200
E[a]	13.57	14.54	- .97	- .76	291	48.76	49.00	- .24	- .14	291	1.40	.42	.98	1.96	335
E[b]	13.16	14.54	-1.38	- .71	273	56.74	49.00	7.74	3.11†	273	- .28	.42	- .70	-1.00	318

III. CRITERION

College	Grade in First Regular English Course				
	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df
A	2.06	2.12	-.06	- .55	414
B	2.05[c]	1.98[c]	.07	.20	141
C	1.71	1.66	.05	.64	562
D	2.32	2.03	.29	1.95	192
E[a]	2.59	2.26	.33	2.06†	332
E[b]	2.64	2.26	.38	1.86	315

† p less than .05.

a Students assigned to one-semester of remedial work.

b Students assigned to two-semesters of remedial work.

c In College B, comparisons are between students in one- and two-semester remedial programs. The means for students assigned to two semesters of remediation appear under Mean (Rem.); the means for students assigned to one semester of remediation appear under Mean (Reg.).

Table 2

Comparisons Between Beginning Junior College Students in Remedial and Regular Mathematics Courses on Specific Achievement, Noncognitive, and Criterion Measures

I. ACHIEVEMENT MEASURES

College	General Mathematics					Algebra				
	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df
A[a]	17.40	20.49	-3.09	-2.15†	112	11.90	14.65	-2.75	-2.05†	113
E[a]	15.40	19.45	-4.05	-1.83	48	8.67	15.86	-7.19	-3.04†	43
F	13.00	16.23	-3.23	-1.61	146	9.07	11.44	-2.37	-1.71	146
G	16.67	17.31	- .64	- .34	64	10.14	12.89	-2.75	-1.70	64

II. NONCOGNITIVE MEASURES

College	Comparative Interest Index, Mathematics Scale					Academic Motivation					Satisfaction with Mathematics Course				
	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df
A[a]	13.17	13.25	- .08	- .04	111	50.09	44.98	5.11	1.50	51	3.00	.69	2.31	4.26†	113
E[a]	23.50	16.08	7.42	2.63†	40	56.33	47.89	8.44	1.89	40	2.10	1.12	.98	.98	49
F	16.20	14.99	1.21	.59	145	20.47	21.90	-1.43	-1.46	137	2.07	1.14	.93	.93	146
G	15.24	22.33	-7.09	-3.48†	65	22.50	22.89	-.39	- .39	62	2.76	2.26	.50	.82	65

III. CRITERION

College	Grade in First Regular Mathematics Course				
	Mean (Rem.)	Mean (Reg.)	Diff. in Means	"t"	df
A[a]	2.19	2.07	.12	.46	104
E[a]	2.50	1.49	1.01	1.81	45
F	1.14	1.89	-.75	-2.11†	145
G	1.17	1.74	-.57	-3.10†	62

†p less than .05.

[a] The data for Colleges A and E are not comparable with those for Colleges F and G because of changes in the CGP battery between 1967 and 1968. This applies to General Mathematics, Algebra, and Academic Motivation.

Table 3

Results of Analysis of Covariance Using Sentences As a Single Predictor and then Using Sentences in Combination with Verbal Score as Predictors of Grades in First Regular College English Course

College	Group I.D.	N	Intercepts Group I	Intercepts Group II	Diff. in Intercepts[a]	d.f.	Chi Square
I. SINGLE PREDICTOR: Sentences							
A	I. Total Rem. II. Total Reg.	83	.453	- .413	.866	1	4.63†
	I. Men Rem. II. Men Reg.	60	.525	- .178	.703	1	.602
B	I. Total 2-Sem. Rem. II. Total 1-Sem. Rem.	62	4.614	3.888	.726	1	1.26
	I. Men 2-Sem. Rem. II. Men 1-Sem. Rem.	48	4.643	3.519	1.124	1	3.67
C	I. Total Rem. II. Total Reg.	113	- .033	.104	- .137	1	3.71
	I. Men Rem. II. Men Reg.	80	.092	.351	- .259	1	4.47†
II. MULTIPLE PREDICTORS: Sentences and Verbal Scores							
A	I. Total Rem. II. Total Reg.	83	.513	- .962	1.475	1	6.15†
	I. Men Rem. II. Men Reg.	60	.317	-1.011	1.328	1	1.65
B	I. Total 2-Sem. Rem. II. Total 1-Sem. Rem.	62	5.295	3.629	1.666	1	1.41
	I. Men 2-Sem. Rem. II. Men 1-Sem. Rem.	48	5.587	3.705	1.882	1	4.94†
C	I. Total Rem. II. Total Reg.	113	.107	.022	.085	1	3.80
	I. Men Rem. II. Men Reg.	80	.052	.224	- .172	1	4.69†

† p less than .05.

Chi Square values of 6.64, 5.41, and 3.84 are significant at 01, .02, and .05 levels, respectively.

[a] A positive value indicates that the Group I performed better than Group II on the criterion.

General Note:

The analysis of covariance method is based on "Regression Tests for Several Samples" by Harold Gulliksen and S.S. Wilks and was originally printed in Psychometrika, Vol. 15, No. 2, June 1950.

Description of Variables used in Present Study

English: Satisfaction with English Courses
Academic Motivation Scale
Comparative Interest Index - English
Sentences Test
Verbal Score

Mathematics: Satisfaction with Mathematics Courses
Academic Motivation Scale
Comparative Interest Index - Mathematics
General Mathematics
Algebra

"Satisfaction with English Courses" (5 items) and "Satisfaction with Mathematics Courses" (4 items) are scales identified as the result of factor analyzing the Satisfaction Questionnaire which was administered to junior college students during the experimental phases of the Comparative Guidance and Placement Program (Modu, 1970). The results are relatively homogeneous scales indicative of the extent of a student's satisfaction or dissatisfaction with his junior college English and mathematics courses. Ratings are on a 5-point scale ranging from 1 (disagree) to 5 (agree).

The "Academic Motivation" score (10 items) summarizes a student's responses concerning past achievement, study habits, attitude, and willingness to work hard for grades. The scales as used in this study changed from 1967 to 1968.

The "Comparative Interest Index in English" stresses creative writing, journalism, public speaking, theatre, and reading for pleasure. Low scores suggest a lack of interest in school-related activities, in study itself, and in self-expression through verbal means. The index for mathematics notes whether or not a student is interested in business mathematics and in the practical application of arithmetic, as well as his degree of interest in algebra, geometry, and the more theoretical branches of mathematics. The scores are on a 0 to 32 point scale and reflect the student's likes and dislikes among activities related to specific areas.

The CGP Battery contains a Verbal score which is the combination of a Reading Test score and a brief Vocabulary Test score (total 35 minutes), and a Sentences Test (20 minutes) that measures a student's mastery of the rules and constraints of standard written English. The measure of mathematical achievement used here consists of general mathematics (20 minutes) and algebra (20 minutes). The Mathematics Test, comprised of general mathematics and algebra scores, is reported on a 20 to 80 scale, with a mean of 50 and a standard deviation of 10.

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